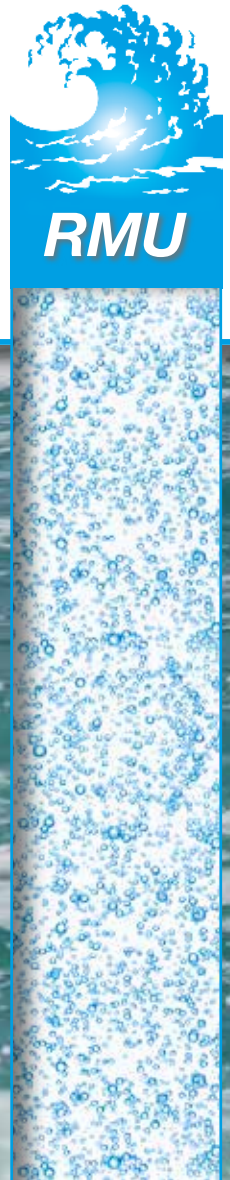


Control at its finest!

MESSNER® ICS

Interactive Control System for
the Activated Sludge Process

RUDOLF **MESSNER** UMWELTTECHNIK





Many convincing arguments.

- Stable system operation**
despite pronounced yearly distribution curves, load peaks, low-load phases, heavy rain events and dry periods.
- Compliance with discharge limits**
is in our common interest.
- Integration in existing process control systems**
i.e. investment cost savings through compatibility with existing hardware. The MESSNER® ICS can be retrofitted and expanded at any time.
- Commissioning / optimization**
of plant operation by our experienced process engineers.
- Additional energy savings**
through load-dependent control and process optimization.
- Transparency**
for the user through a system that can be realized directly on the PLC. The operator should be able to understand and observe the processes to intervene.
- Remote maintenance**
through the use of appropriate software solutions guarantees a permanent "onsite" support when help is needed.
- Flexibility through modules**
in terms of the equipment and functionality. We adapt our system to your wishes and objectives.
- Individual concept creation**
specially tailored to the demands of your activated sludge process.
- Personal support**
e.g. through the conclusion of a support contract. Personal contact with you is important to us! Instruction on the basics of the MESSNER® ICS on site is a matter of course.
- Interactivity**
with learning effects for the operator is our objective. The optimum operating state is different for every treatment plant and can be achieved over time only with varying settings.

MESSNER® ICS – Control at its finest.

MESSNER® ICS stands for MESSNER® Interactive Control System. As the product name suggests, we bring interactivity into the focus of our control system – in order to link the experiences of the operating personnel with our own, and to thereby realize the best possible plant operation.

A precondition for interactivity is the complete transparency of the system. In contrast to closed systems ("black box"), we wish to ensure the user has a comprehensive insight into the processes and parameters of the control program. A deep understanding of the process is the basis for optimum cleaning results.

Aeration
Today, the most important selection criterion for a suitable aeration system is sustainability through a high quality level. This is guaranteed by the materials used (stainless steel AISI 316, TPU), very long service lives and high efficiency values. Our solution: The MESSNER® Aeration Panel.

Control
Further gains in efficiency and process optimizations are possible through an individual control concept tailored to requirement. Our solution: The MESSNER® ICS. For over 20 years, RUDOLF MESSNER UMWELTECHNIK

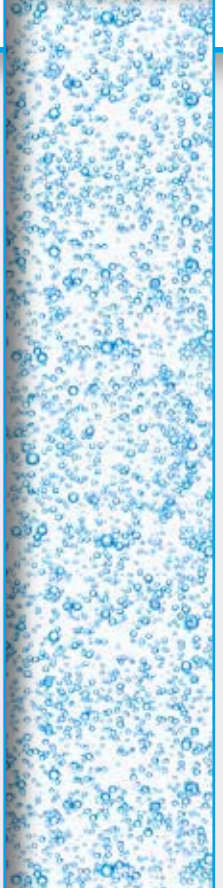
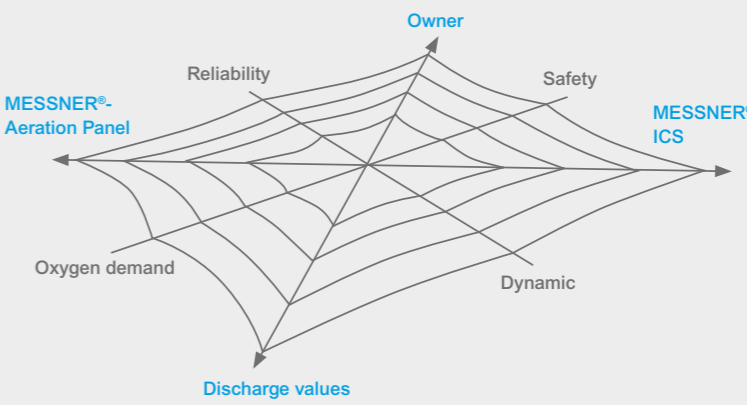
has been working on the optimization of process sequences for biological cleaning stages and develops control strategies that are implemented together with the plant operators.

System solution
The MESSNER® Aeration Panel and the MESSNER® ICS with its modular configuration fit perfectly to each other. For example, they form the basis for the implementation of our EnCoFlow® System for the holistic optimization of the activated sludge treatment in terms of stable plant operation with low discharge values and high energy efficiency.

MESSNER® ICS – Operating safety first.

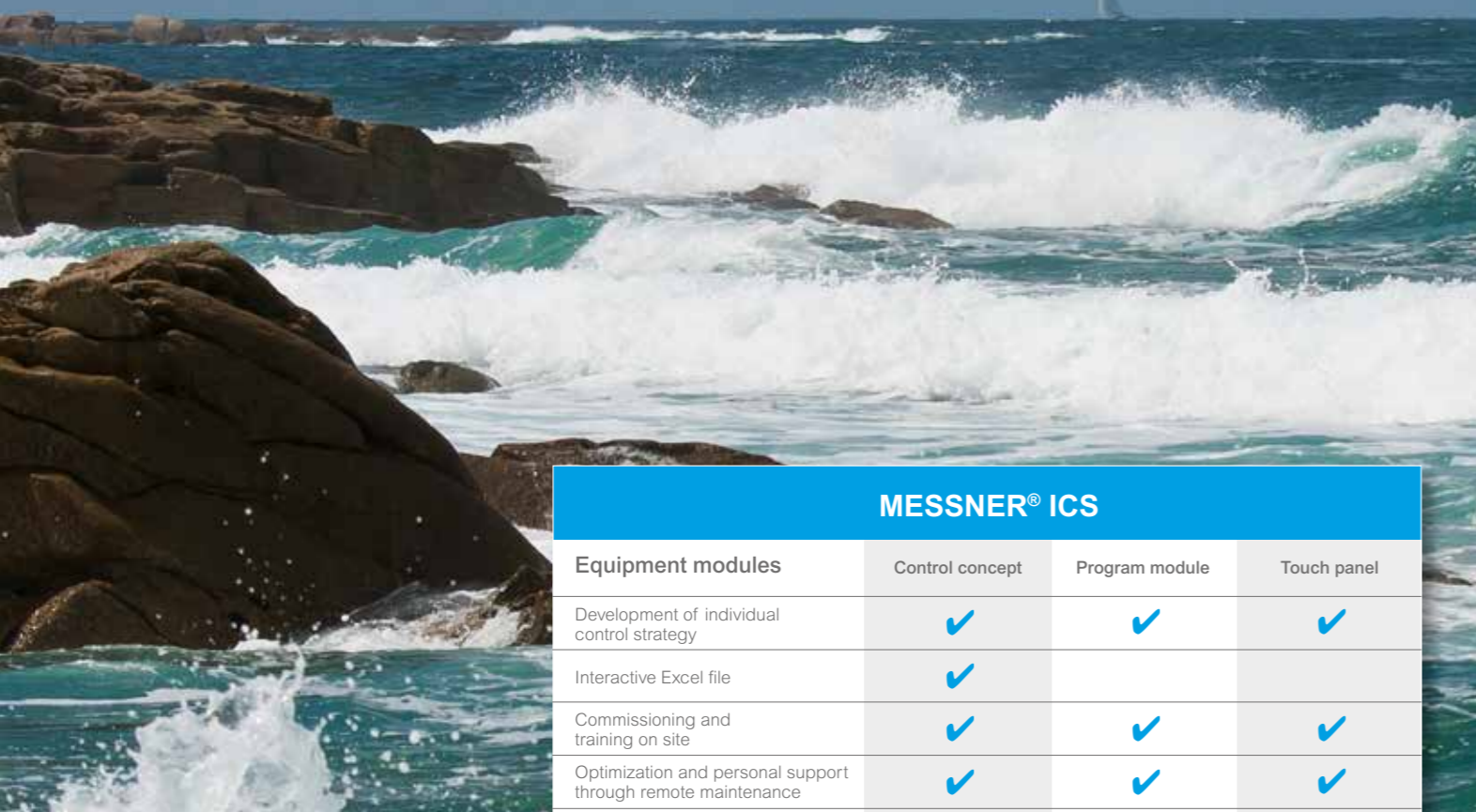
Linking the aeration system with MESSNER® Aeration Panels and the control system MESSNER® ICS results in a stable network that delivers our customers security and flexibility at the same time.

- With the implementation of the MESSNER® ICS, you receive**
- a perfectly harmonized complete solution from a single source.
 - one personal and competent contact partner for aeration and aeration control.
 - our more than 35 years of experience with the aeration of activated sludge systems.
 - assurance through more than 200 reference plants for control systems, and well in excess of 1,000 reference plants in total.



Equipment modules for the MESSNER® ICS.

We are constantly improving our control concepts, enabling us to offer holistic solutions in accordance with state of the art engineering practice. The modular design makes it possible to continuously optimize your processes.



MESSNER® ICS			
Equipment modules	Control concept	Program module	Touch panel
Development of individual control strategy	✓	✓	✓
Interactive Excel file	✓		
Commissioning and training on site	✓	✓	✓
Optimization and personal support through remote maintenance	✓	✓	✓
Programming service		✓	✓
Visualization			✓
Hardware (optional)		✓	✓

Control concept for your aeration system with MESSNER® Aeration Panels

We develop a conceptual control strategy based on Excel for optimized technical process operation of the biological stage. Integration in the existing programmable logic controller is performed by the customer. The control recommendation includes all actions that are necessary to align and optimize the existing control together with the aeration system.

RMU program modules

In addition to developing the control strategy, this module also includes programming the MESSNER® ICS. The concept is implemented with a Siemens programmable logic controller S7-1500, which is integrated in the existing process control system via the "Profi-Net" bus system.

Visualization on a touch panel

Programming of a user interface for the graphic illustration and regulation of the control parameters of the MESSNER® ICS.

With our equipment modules you choose the delivery limit for your MESSNER® ICS. Our proposal ranges from the creation of a control concept right through to a complete solution including visualization.

Function modules for the MESSNER® ICS.

Aeration control

- Sliding oxygen target value calculation for controlling the biological activity.
- Dynamic control of the phase lengths of denitrification and nitrification with the aid of the MESSNER® step control.
- Actuation of the RMU Air Pulsing for mixing the activated sludge.
- Determination of the sliding pressure target values for blower control and/or control valves.

Control of the sludge circuits

- Control of return sludge conveyance depending on the influent quantity.
- Load-dependent control of the recirculation for optimization of the nitrogen elimination.

Control of the dosage

- Load-dependent precipitating agent dosing for phosphate elimination.
- Balancing of the nutrient ratio by dosing an external C-source.
- Addition of lime for stabilizing the acid capacity.

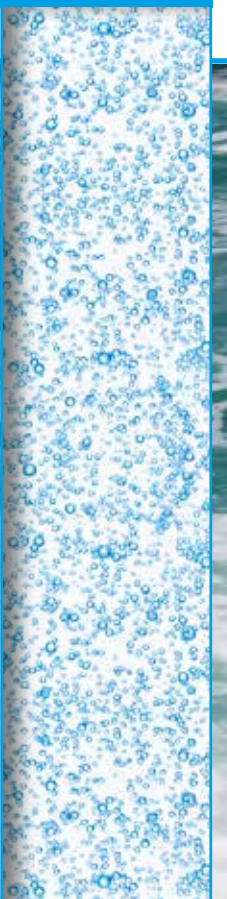
Sliding oxygen target value calculation
(load, discharge values)

Dynamic nitrification / denitrification phase lengths
(load, discharge values)

RMU Air Pulsing for mixing
(frequency, pulse duration)

Sliding pressure control for blowers and valves
(setpoints for pressure and valve)

MESSNER® ICS – Modularity on two levels.



Dynamic in every step.

The intelligent implementation of innovative concepts makes our MESSNER® ICS a highly flexible and economically attractive solution.

Sliding pressure control

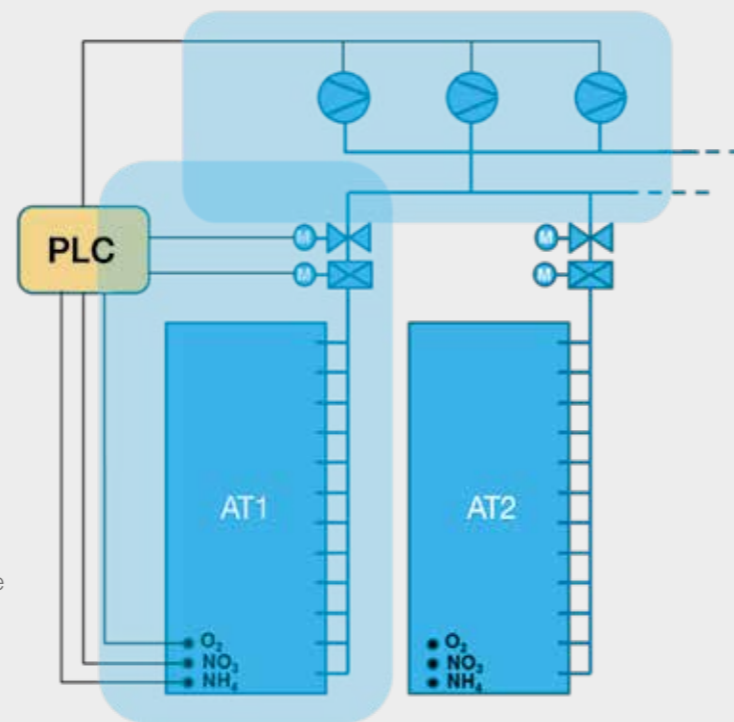
- Dynamic oxygen target value
- Dynamic pressure target value in the pipe system
- “Most-Open-Valve” principle

Alternating intermittent aeration

- Dynamic, load-dependent control of the aeration intensity
- Alternating aeration of parallel activated sludge tanks
- Consistent blower utilization at optimum performance

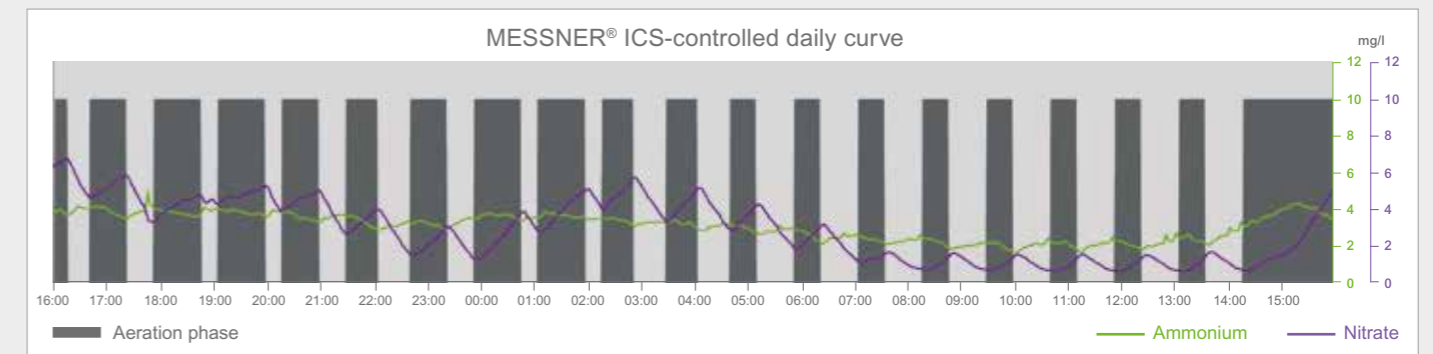
Step control

- Splitting of the cycle time into individual aeration steps
- Dynamic distribution of the denitrification / nitrification time
- Clear presentation of the control parameters



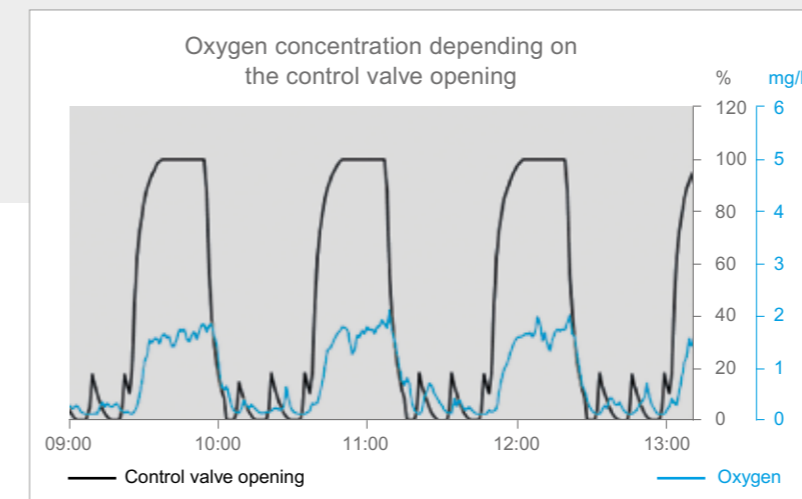
MESSNER® ICS-controlled daily distribution curve with dynamic aeration cycles

The daily distribution curve clearly illustrates the dynamics of the requirement-oriented aeration phases. Actual ammonium and nitrate concentrations in the biological process control the aeration times.



Oxygen control

The MESSNER® ICS pursues the objective of opening available control valves 100% whenever possible, and thereby minimizing pressure losses in the air feeding pipes (“Most-Open-Valve” principle). If the oxygen concentration in a tank approaches the corresponding oxygen target value, the air quantity fed into the system is reduced by the sliding pressure control. During non-aerated phases, mixing of the activated sludge takes place with the help of the RMU Air Pulsing.



MESSNER® ICS – From theory into practice.

Since the 1990s, RUDOLF MESSNER UMWELTECHNIK AG has been developing control systems for the biological cleaning stage. The MESSNER® ICS has been successfully installed in more than 200 treatment plants, and optimizes the process sequences of aerobic waste water purification here (refer also to our reference list).

Facts of a reference plant after the renewal of the aeration system and optimization of the control system

Implementation:	2015
Construction size:	250,000 EW
Activated sludge tanks:	17,800 m³
Process engineering:	EnCoFlow® System
Aeration system:	MESSNER® Aeration Panel
Control system:	MESSNER® ICS
Total investment:	€ 1.2 million
Discharge values Ptot / Ntot:	-34% / -20%
Cashback (promotion):	€ 730,000
Energy savings:	approx. 400,000 kWh/a



“Our thinking and actions are based on the laws of nature.”

Rudolf Messner



Worldwide in use.

RUDOLF MESSNER UMWELTTECHNIK AG is represented nationally and internationally by established sales and license partners, and offers the quality of the MESSNER® Solutions you are accustomed to, in combination with professional installation and support, directly in the respective regions and countries of the world.

RUDOLF **MESSNER** UMWELTTECHNIK



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